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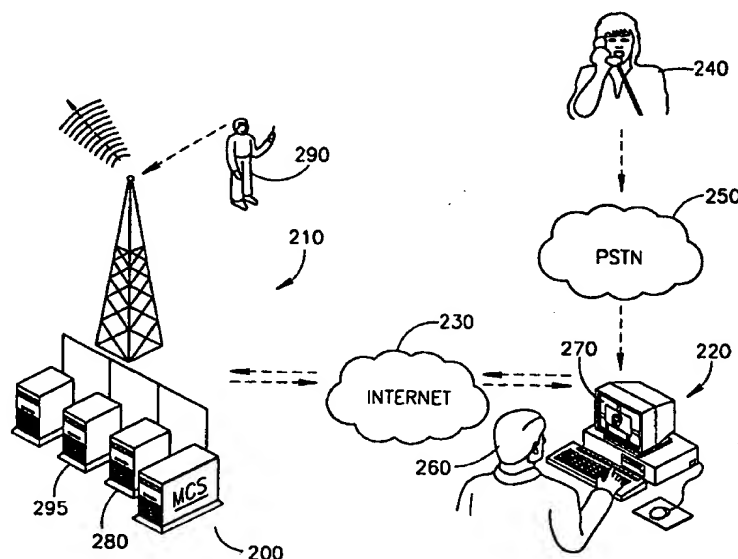| The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Dominique DELMAS
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(54) Title: A METHOD AND SYSTEM FOR MANAGING MOBILE WORKERS

(57) Abstract

A system for managing mobile workers. The system pertains to organizations that employ mobile workers and wish to improve control over the mobile workers, increasing worker's productivity through dynamic workload allocation and job assignment. The system includes a server, installed at the central office switch of the mobile communication (Radio or Cellular) network operator, or service provider and a client system, installed at the service organization's office. The system includes a computerized system operative to: defining a current task assignment schedule to a worker, and communicating the current schedule to the worker, and automatically monitoring the worker's location during the current schedule, and correlating the monitored location with the current schedule, and selecting and reporting aspects of the correlation.

A Method and System for Managing Mobile Workers

FIELD OF THE INVENTION

This invention relates to electronic communications and more specifically, a method and system relating to managing mobile workers.

5 ## REFERENCES

There follows a list of references that is referenced in the following description. The definitions of the terms are given for convenience of explanation and should not be regarded as binding.

1. http://www.acronymfinder.com/
10 2. http://www.icq.com/products/whatisicq.html
3. http://www.buymarket.com/data999/004819127.shtml
4. http://wombat.doc.ic.ac.uk/foldoc/index.html
5. http://www.techweb.com/encyclopedia
6. http://technet.microsoft.com/cdonline/default-f.asp?target=http://techn
15 et.microsoft.com/cdonline/content/complete/windows/win2000/win2ksr
v/technote/disesewp.htm

BACKGROUND OF THE INVENTION

Today's Enterprise Resource Planning (ERP) Systems. large and small, have many characteristic problems in the managing of mobile workers. More

specifically, mobile workers of all trades have one thing in common, they are hard to manage. Every field service company knows the problem all too well. Once the workers are out the door there is very little control over them. And when new calls for service come in, dispatching attempts are normally

5 sporadic and cumbersome.

As a result, idle time and inefficiency of field service workers have become an acceptable 'evil'. Notwithstanding, by prevailing consensus, it directly affects the organization's operational profit margins, levels of service and customer satisfaction.

10 Field service organizations of all trades lack one thing in common, a standards-based workforce management solution. Over the years different solutions were introduced in the market to cope with the inefficiencies of mobile workforce management. Some were software oriented back office solutions for scheduling and optimization, while others were GPS (Global

15 Positioning System) enabled fleet management solutions. Problem is they were all proprietary solutions by nature, expensive and complicated to implement. Effectively, only the top leading service organizations in each industry had the vision and the means to implement advanced integrated solutions of this kind.

20 Companies and organizations that operate mobile workforces utilize manual or computerized planning programs to schedule their workers' job assignments and time- tables. Current procedures entail in-advance scheduling of job assignments, normally triggered by requests for service or routine maintenance requirements. Usually the work itinerary is provided to

25 the field worker each day for the next day/s and on his return he is expected to report on the results.

Same-day changes to the field worker's itinerary require cumbersome and costly dispatching procedures. The dispatcher needs first to conduct a search for the field worker, confirm his location and job status and then

converse with him, by telephone or radio communication, before altering his daily itinerary.

Two main problems readily arise from the inability to control and manage dynamically changes in the workflow of their mobile workforces:

5   1.   Undesired level of service provided to customers, reflecting on the organization's reputation and competitive position.

2.   Poor productivity level of field workers, reflecting on the organization's labor overheads and bottom line profitability.

There is a clear need amongst substantially, all service organizations to 10 be able to better control worker's job status and whereabouts. Manual search and verification procedures of a mobile worker's location and job status were proven to be exhaustive to dispatchers and, moreover, foremost ineffective. A centralized, technology based, location and communication system could automate search and verification procedures and enable data-oriented fast and 15 economical dispatching techniques.

Notwithstanding the aforesaid description, there are many existing components that may successfully contribute to a system for managing mobile workers. For example, each of the following US patents teaches a potentially indispensable component for the building of a system for managing mobile 20 workers: 5155689, 5299132, 5388147, 5398190, 5513111, 5519621, 5652707, 5682421, 5799061, 5831519, and 5835061. Furthermore, there are many commercially available components, which may contribute to the building of a system for managing mobile workers. More information about such commercially available components, manufactured by various 25 companies, can be accessed, utilizing the following list of WWW-addresses. It should be noted that the list does not constitutes completeness.

http://www.signalsoftcorp.com/;

http://www.ericsson.se/SE/epk/mpc/docs/mpsfaq.html;

http://www.ericsson.se/Eripress/19981105-0039.html;

http://www.trueposition.com/tdoa.htm;

http://www.geo.ed.ac.uk/home/giswww.html;

http://www.atm.co.il/msl98.htm; or

http://www.jya.com/cell-track.htm.

5   Surprisingly, even with essentially all of the indispensable components necessary for the building of a system for managing mobile workers available, and indeed, with the clear need in today's ERP Systems, a facile method for managing mobile workers has not been forthcoming.

SUMMARY OF THE INVENTION

10   For convenience of explanation, the term MCS (Mobile Command System) is used in below description.

   This invention pertains to organizations that employ mobile workers, wish to improve control over them and increase worker's productivity through dynamic workload allocation and job assignment. The invention

15 assumes that the organization currently employs a computerized customer database and, or work planning, or customer interaction software. In addition, it is assumed that field workers are, or will be equipped with a cellular, or radio, telephone or terminal as a communication means, or the like.

   The system of the preferred embodiment of the present invention is a

20 software-based solution for mobile workforce management. It includes two software-based modules operating under Client / Server architecture.

   The first module is the server program, installed at the central office switch of the mobile communication (Radio or Cellular) network operator, or service provider. The second module is the client program, installed at the

25 service organization's office. Both client and server software can be offered as a software suite, to be integrated within existing computerized systems. Alternatively, the software suite can be offered together with hardware to be integrated or interfaced with third party equipment.

Once these two software modules are in place, one out of many possible scenarios is the following proceeding:

- A service call is received via the telephone, the Internet, or in person.

- The service agent accesses the "present invention" client program and commands a search for the field workers in a general, or specifically defined geographical area.

- The "present invention" client program initiates a data query to the "present invention" server program, which in turn triggers a location query to the network operator's system. The operator's system, utilizing base-station location information, identifies the location of designated cellular / radio subscribers in relationship to the base-station they are currently covered by.

- Once location information is obtained, the "present invention" server transmits the data to the "present invention" client, where a digital map is displayed with the field workers location appearing in the form of icons. Provided integration with organization's information system, each icon can actively display any information related to the field worker's details, schedule, etc.

- The service agent selects the appropriate field worker to perform the job.

- The service agent types a data message at the "present invention" client, containing all pertinent job information, and transmits it to "the present invention" server.

- The "present invention" server communicates the data message to the network operator's SMS (Short Message Service) or other data transmission system

- The field worker receives the data message, originated at the service agent "the present invention" client, to his cellular, or radio, telephone / terminal.

- Subject to the prevailing business rules and, or availability of two way data messaging over the network, the field worker can confirm, reject, or comment by sending back a data message to the agent's "the present invention" client, through the "present invention" server.

It is appreciated that the above-described proceedings can equally well be performed automatically with no human (service agent) intervention.

By implementing the "present invention" system several problems are solved:

- A service organization will no longer need to search for his workers through manual, voice communication based, dispatching techniques.

- Through the "present invention" client, it can rather control, in real time, the location of multiple field service workers instantaneously, upon request.

- Unlike with other location technologies, i.e. GPS, radio devices, etc. utilization of cellular location techniques, requires no installation of special positioning and communication equipment, thus reducing dramatically the cost and complexity of the solution.

- By enabling two-way data messaging workers can report job status in real time, updating dynamically and automatically corporate information files.

- Circumventing time consuming and expensive voice communications, data communication is fast, precise and cost

effective. (Many cellular operators are currently providing it even free of charge).

The present invention has many advantages over current solutions.

- Current solutions involve the installation of special (proprietary or dedicated) equipment on the field worker's end, to determine location.

- The "present invention" system utilizes the wireless network to retrieve a subscriber's location, based on the mobile terminal routine signaling, with no extra hardware devices.

- Current solutions involve manual voice communication dispatch methods. The "the present invention" system offers integrated, location triggered, data messaging methods for fast, economical and efficient dispatching.

- Utilizing a client on the enterprise communication network side and a server on the side of the wireless network's central office switch provides for seamless communication integration, and most reliable data transmission applications.

In the context of the present invention, a mobile worker may be an individual journeyman, a work crew, or a team having individuals, crews, foremen, etc. For example, a plumber may be a mobile worker, an electrician and his assistant may be a mobile worker, a road repair crew may be a mobile worker, or even a single dispatch of fire-fighting equipment, ambulances, police, and crisis management personnel may be a mobile worker.

According to the preferred embodiment of the present invention, the present invention relates to a method for managing a mobile worker, the method including the steps of:

(a) defining a current task assignment schedule to a worker; and

(b) communicating the current schedule to the worker; and

(c) monitoring automatically the worker's location during the current schedule; and

(d) correlating the monitored location with the current schedule; and

(e) selecting and reporting aspects of the correlation.

According to the preferred embodiment of the present invention, the current task assignment schedule is modified and the modification to the current schedule is communicated to the worker. The "current task assignment schedule" is either as defined in step (a) or as herein modified.

According to one embodiment of the preferred embodiment, modifying the current task assignment schedule is effected automatically. According to another embodiment of the present embodiment, the modification is negotiated with the worker. Alternatively, both of these embodiments can be combined into another embodiment. In some mobile worker management contexts it may be preferable to give first preference to automatic modification and thereafter to accept schedule change objections from the worker. In other mobile worker management contexts it may be preferable to give first preference to the worker's perspective on accepting modifications to his own schedule.

According to the preferred embodiment of the present invention, the defining (step (a)) is using relational database-like rules. Alternatively, there may be hierarchies of rules which are applied to the defining, such as considering costs, priorities, worker skills, available tools, schedules for delivery of parts, etc. As a method for use with mobile workers, according to the preferred embodiment of the present invention the defining, or modifying of a current task assignment schedule (step (a)) is optimized for minimum travel.

Furthermore, according to one aspect of the present invention, the modified current task assignment schedule is using a priority grade for the task assignments and therein is optimized for minimum travel. According to

another aspect of the present invention, the modification to current schedule is communicated to the worker.

Thus, the communicating (step **(b)**), reporting (step **(e)**) and the communication of modification to current schedule utilize, but are not limited to, *inter alia*:

1. email,

2. facsimile,

3. cellular telephone voice channel,

4. cellular telephone signal channel (Short Message Service),

5. internet www interactive website,

6. VOIP (Voice Over Internet Protocol [1]) telephony,

7. IDEN (Integrated Digital Enhanced Network (Motorola variant of TDMA wireless) [1] -type digital radio,

8. posting to a media to which the worker has access, such as *inter alia*:

   (A) a chart pinned to a bulletin board,

   (B) work order authorization or request sent by messenger,

   (C) oral statement,

   (D) presentation at a meeting,

   (E) various internet posting platforms (private or closed chat-, usergroups-, ICQ-like-, and based upon ICQ- applications).

(ICQ – "I seek you" – ICQ Inc.: ICQ is an Internet tool that informs who's on-line at any time and enabling contact at will. Mode of communication can be freely chosen, regardless of application, be it chat, voice, message board, data conferencing, file transfer or Internet games, the entire message is transferred in real time [2]).

In addition, the communicating (step **(b)**) is in digital form. "Digital form," in the context of the present invention, relates to digitized packet containing a part of a task assignment schedule, format information for the schedule, or transactions relating to the schedule. These digitized packets are

transmittable with the highest efficiency over today's electronic communications systems.

Furthermore, the communicating (step **(b)**) includes transmission of *inter alia:*

5   **a.** voice,

b. data,

c. printed material,

d. graphics,

e. maps,

10 **f.** codes,

g. video, or/and

h. multimedia.

According to the preferred embodiment of the present invention, the communication includes a content redundant combination of at least two of

15 the aforesaid. For example, the communication may be a voice instruction describing a modification in the schedule, and the voice instruction is sent with a map and with a text work-order, breaking down the entire new item in the schedule according to task, skills, tools, parts, identification and reference numbers, etc.

20   According to the present invention, the monitoring is accomplished by *inter alia :*

1. cellular telephone cell based locating of the worker and the worker maintains a proximate cellular telephone,

2. querying the worker and recording the worker's location response, or

25 **3.** querying a GPS monitor and the worker maintains a proximate GPS monitor.

In this context "proximate" may be on the worker, in the worker's toolbox, in the worker's vehicle, or with the worker's team foreman. Similarly, there are many different levels of location precision that may be

required in actual applications. For example, in dispatching a road repair crew, it may be sufficient to know that they are in the cellular telephone cell where the work needs to be done. On a construction site, however, it may be important for management monitoring to know the location of each worker to

5 within a few meters. When high precision location knowledge is important, locating includes the use of triangulation or cell intersection, in the cellular telephone locating context or precise known *per se* triangulation GPS locating, in the GPS locating context.

According to the preferred embodiment of the present invention, the

10 monitoring (step (c)) is done periodically, according to anticipated location changes indicated in the current task assignment schedule, randomly, or upon management query. According to the preferred embodiment of the present invention, the monitoring (step (c)) is done at each occurrence of the worker reporting or transacting with management, or upon the turning on a worker's

15 communications unit, or upon each occurrence of a worker's communications unit entering a new communications cell. In this context, the "communication unit" may be the mobile worker's cellular telephone/pager, two-way radio, or the like.

According to the preferred embodiment of the present invention, the

20 correlating (step (d)) discovers location violations from the current task assignment schedule, measures accuracy of the current task assignment schedule, or/and measures the worker's productivity against a current standard of productivity for each assigned task. Furthermore, the selecting (step (e)) is using relational database-like rules.

25 As a method for use with mobile workers, according to the preferred embodiment of the present invention the defining, or modifying of a current task assignment schedule (step (a)) is optimized for minimum travel.

According to the preferred embodiment of the present invention, the correlating (step (d)) is represented on a map. This map may then be of use

to a dispatcher, or to a manager. The map may be stored digitally or may be rendered as a physical document.

Furthermore, the present invention relates to a method for managing a plurality of mobile workers. This method for managing a plurality of workers

5   includes managing each mobile worker according to the method as heretofore defined, wherein the plurality of current task assignment schedules is using a priority grade for the task assignments and a worker qualification grade for each worker.

In addition, the present invention relates to a distributed system for

10 managing a plurality of mobile workers using the method as heretofore defined, the system including three types of situated apart, interconnected modules:

I. at least one client application module for:

(a) defining a current task assignment schedule to a worker,

15 **(b)** communicating the current schedule to the worker,

(d) correlating the monitored location with the current schedule,

(e) selecting and reporting aspects of the correlation, or

(f) modifying the current task assignment schedule;

II. at least one server application module for:

20 **(b)** communicating the current schedule to the worker,

(c) monitoring automatically the worker's location during the current schedule,

(d) correlating the monitored location with the current schedule, or

(e) selecting and reporting aspects of the correlation; and

25 **III.** at least one worker application module, wherein each module is associated with a communication unit and wherein there is a predefined transaction format between any pair of modules.

Note that the reference letters, **(a)** through **(e)** correspond to steps in the method, and that there is an optional assignment of functions **(b)**, **(d)** and **(e)** to either module **(I)** or **(II)**.

According to the preferred embodiment of the system of the present invention, transactions between the modules include a common GIS (Geographic(al) Information System [1]) location description for the worker and his task assignment. Furthermore, according to the preferred embodiment, location descriptions for the worker and his task assignment are represented graphically on at least one map.

According to the preferred embodiment of the system of the present invention, fulfilling of a customer request for visitation by a task qualified mobile worker includes: the client application recording the visitation location by using customer query response, using a customer registration, or by using a query response of an accessible database; the client application searching for at least one qualified mobile worker who is presently near the vitiation location or whose task assignment schedule will locate said at least one qualified mobile worker near the visitation location; and the search is conducted using records of the client application or using a last known location for workers accessible from the server application. Furthermore, according to the preferred embodiment, the client application selects worker for task assignment scheduling to the visitation location.

According to one aspect of the present embodiment, the client application conveys worker-customer direct communication information to either the worker or to the customer. Alternatively, according to another aspect of the present embodiment, the client application negotiates, with the worker or with the customer, adding of the visitation to the workers task assignment schedule. As in the method of the present invention, there are embodiments that allow these aspects to overlap.

According to the preferred embodiment of the system of the present invention, the client application opens a virtual session at the server application, and provides the server application with automatic rule based monitoring and reporting instruction logic.

5   According to the preferred embodiment of the system of the present invention, the client application module or the server application is divided into two interactive portions, one portion located at a processor of a client and the other portion at a server of a network, and a predetermined transaction protocol binding the two portions. According to one aspect of the present

10   embodiment, the portion located at the processor of the client in substantially restricted to simple input and output transactions. According to another aspect of the present embodiment, the portion located at the processor of the client maintains a substantially current download of data from the server application. Likewise, since the system of the present invention may

15   simultaneously relate to clients of different preferences, these aspects may overlap.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to understand the invention and to see how it may be carried out in practice, a preferred embodiment will now be described, by way of

20   non-limiting example only, with reference to the accompanying drawings, in which:

Fig. 1 is a schematic diagram showing the main components of the Mobile Command System.

25   Fig. 2 is a schematic diagram showing the components of the Mobile Command System in more detail.

Fig. 3 is a schematic chart showing the Mobile Command System architecture.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

For convenience of explanation the invention is described below with reference to a preferred embodiment, which constitute a cellular enabled mobile command system for mobile workforce management.

5   Those versed in the art will readily appreciate that the invention is by no means bound to this embodiment and the examples described herein and that a multitude of variations and applications are within the scope of the present invention.

The Mobile Command System was developed to allow intelligent
10   mobile workforce management through standard cellular data communication and information technologies. The system features a unique, rule-based, process (according to the present invention) which provides on-demand real time location information and 2-way SMS messaging. Through this process the system also enables the implementation of automatic event notification
15   from the field based on a user-defined set of enterprise business rules.

The solution is comprised in three main system components, with reference to Fig. 1:

a network based server 100; and

a remote client software application 110; and

20   a cellular phone/pager 120.

Turning now to fig. 2, server 200 resides at the cellular operator's MSSC (Mobile Services Switching Center) 210 while the client software is installed commonly at the service organization's office. The remote client workstation 220 communicates efficiently with the server 200 via an Internet
25   connection 230.

There follows now a brief discussion describing a possible scenario wherein a preferred embodiment of the present invention is utilized:

1. A customer's call 240 comes in via, commonly a PSTN (Public Switched Telecommunications/Telephone Network [1]) 250.

2.   The customer service representative **260** is presented with a map **270** with the customer's location in the center of map **270** by the client software on the remote client workstation **220**.

3.   Then, remote client workstation **220** queries server **200** for the current location of designated worker/s **290** in the customer's vicinity, utilizing location module **280**, part of MSSC **210**.

4.   Once a qualified worker was selected for the job, a dispatch message via internet-based SMSC (Short Message Service Communicator) **295** appears in seconds directly on his cellular phone.

5.   The worker can reply in return, by a key–stroke, from an assortment of customized messages stored in his cellular phone, or by free alpha–numeric input.

6.   Optionally, using his cellular phone, the field worker can also browse his company's Web for additional product or customer information.

Cellular operators can now offer new differentiating, value added Business services. Tying in lucrative corporate customers by the core of their business.

In today's cellular business arena competition is primarily marked by discounted rates and marketing packages. Operators are constantly searching for differentiation through value added services. Most, though, provide very similar value added services, such as Voice mail, caller ID, etc.

With the Mobile Command System, cellular operators are able to offer a new line of value added services: application oriented business services. application oriented business services are business services that have significant impact on the very core of a corporate customer's business and help elevate individual productivity and control over its field service operations.

The lucrative markets of service organizations and mobile professionals represent a significant segment in the cellular communication

industry not the least on account of these customers representing by definition 'heavy communication users', utilizing their cellular phones as a "mission critical" business tool. Thus, unlike regular consumers, these customers are less interested in savings

5   Aimed at field service organizations of all sizes, the MCS is easy to implement, by virtue of its modular configuration.

The MCS solution involves three elements, all offered to the customer by the cellular operator:

A. Cellular phones for the use of mobile workers.

10 **B.** Subscription to the operator's MCS location and 2-way messaging services.

C. Easy to install, MCS client software, including Geographical Information System (digital map) and a basic mobile workforce management application. Open API (Application Program(ming) [1])

15 Interface and JAVA (a general purpose, high-level, object-oriented, cross-platform programming language developed by Sun Microsystems [1]) interfaces are available for seamless integration with Help-desk / Enterprise Management software applications.

Applicants are confident that the system of the present invention will

20 significantly change the field service management paradigm.

Tangible, measurable benefits make the Mobile Command System a significant solution to common and awkward situations:

A. With no up-front investments, field service organizations can immediately start exploring the advantages and benefits of real-time

25   workforce monitoring and 2-way data messaging services.

B. Providing substantially instant monitoring and data communication with mobile workers through basic, standard devices and applications. This significantly contributes to higher efficiency levels of dispatchers and

greater productivity of field workers. Thus achieving more jobs being handled, per worker, per day or, in financial terms, improved profitability.

c. Generating an estimated total monthly cost, per mobile worker, instrumental for obtaining substantive productivity gains.

5   There follows now a brief discussion on the architecture of the present invention with reference to Fig. 3.

The Mobile Command System (MCS) Client/Server architecture consists of two main components: the MCS server **300** and the MCS client **305**. The MCS server is connected to the cellular operator LAN (Local

10   Access Network, or Local Area Network [1]). The MCS client is a remote application that communicates with the MCS server via the Internet.

The MCS server is preferably, a multi-tier distributed application, such as e.g. the Windows DNA model (Distributed interNetwork Architecture [1]) of *inter alia*, presentation tier, business logic tier and data tier, which can

15   physically distribute processing over a multitude of computers for scalable, manageable and maintainable server applications. The MCS server runs preferably, on a Microsoft Windows NT (New Technology [1]) server, utilizing an internal database engine, such as the MICROSOFT - BACKOFFICE® SQL SERVER ENTERPRISE ED V7.0 (Clustering model),

20   offered by *inter alia*, CODE Micro Systems, 770 Sycamore Avenue, J-108, Vista, CA 92083, USA [3].

The MCS client is preferably offered in two configurations:

I.   iMCS - a thin client, WEB (entanglement or mesh in context with the World Wide Web — WWW, an Internet client-server hypertext distributed

25   information retrieval system which originated from the CERN High-Energy Physics laboratories in Geneva, Switzerland [4]) based HTML (Hyper Text Markup Language [1]) application, providing location information, two-way data messaging and mobile workforce management facilities. Field workers' location is presented on a raster map, retrieved from the server.

II. eMCS - a rich client for the enterprise, containing a vector map engine and communicating with the server via a COM (Component Object Model [1]) interface over HTTP (Hyper Text Transport Protocol [1]).

The Mobile Command System Server **100** (Fig. 1) comprises of the

5 following components:

I. MCS Database

The MCS database server is preferable Microsoft SQL7 (SQL - Structured Query Language [1]).

The database in general holds the following information:

10 **(i)** Service subscribers,

(ii) Mobile phone information,

(iii) Location information,

(iv) Profiles,

(v) Rules and Actions,

15 **(vi)** Security and Logs.

II. MCS Database Service

The database service role is to act as a database interface i.e. a set of functions that are used to manipulate the fields of each of the database tables by other components on the server.

20 III. SMSC Gateway

The SMSC **295** gateway is the gate used by the SMS Service to send and receive SMS messages. The gateway doesn't contain any business logic but is simply used as communication component to the provider's SMSC, packaging the messages in a defined format prior to

25 transmission and filtering the received messages before transferring them back to the SMS service. The gateway is logically divided into 2 complimentary units (Transmit/Receive), each unit manages an internal message queue. Only the SMS Service can access the SMSC Gateway.

IV. SMS Service

The SMS Service, part of the SMS Module **310**, is used by other components in the server to send / receive SMS messages. The SMS Service contains all the logic necessary for dealing with several different message sources and types.

V. Location Gateway

The Location Gateway uses several methods to access location information, which can be combined, if required:

(i) Cell/Sector based location, obtained by a special STk application,

(ii) HLR/VLR (Home Location Register/ Visitor Location Register [1]), and

(iii) Location Servers.

VI. Location Service

The Location Service is used by other components in the server to access mobile telephone's location information. Substantially, all location requests are sent via the Location Gateway, part of the Location Module **315**.

VII. Billing Service

The Billing Service role is to read database log, at predefined times and generate billing data for the cellular operator's Billing Gateway (BGW), part of the Billing Module **320**.

VIII. Rule-based Engine

The Rule-based Engine, using a dedicated rule-based processor **325**, automatically monitors a worker's location and verifies it against current scheduled tasks, enterprise business rules and, or management restrictions. If a rule has been violated, a notification action is being taken according to a predefined set of actions.

IX. Rule-based Service

The Rule-based Service provides an interface to MCS clients in order to set / modify rules. It also provides the necessary services to the Rule-based Engine for executing actions upon rules violations.

x. Request Service

5   The Request Service, part of the Request Handler **330**, acts as a general client interface and therefore offers a wide variety of actions based on user login rights.

After completing the authentication phase each user request is tested against user permissions retrieved from the internal database and

10   transferred to the defined component for execution. An answer to a client request is returned via a special event mechanism.

XI. Supervisor Application

The Supervisor application is used for administrative tasks.

Such tasks may include adding new customers, adding new workers,

15   constructing various reports, setting general rules, server maintenance, etc.

XII. Security

The MCS server services are obtained using a DCOM (Distributed Component Object Model [1]) secured interface over HTTP. Using the

20   HTTP protocol as a carrier enables the server and the client to comply with standard security issues such as using a FIREWALL (a method for keeping a network secure; it can be implemented in a single router that filters out unwanted packets, or it may use a combination of technologies in routers and hosts [5]).

25   The current authentication implementation **335** supports preferably the NTLM (Microsoft Windows NT LAN Manager [1]) protocol and the SSL (Secured Socket Layer – Netscape [1]). With the release of NT5 the KERBEROS protocol will be preferably supported as well.

There follows now a brief clarification of the above mentioned terms KERBEROS, NTLM, SSL, and STk:

- KERBEROS (authentication system of the Project Athena, developed at Massachusetts Institute of Technology, Cambridge, MA, USA.). The Kerberos authentication protocol is a mature industry standard that has advantages for Windows network authentication of both client and server and delegation of authorization from clients to servers through the use of proxy mechanisms. The Kerberos Version 5 authentication protocol replaces NTLM as the primary security protocol for access to resources within or across Windows 2000 domains. Some of the benefits of Kerberos protocol are mutual authentication of both client and server, reduced server load during connection establishment, and support for delegation of authorization from clients to servers through the use of proxy mechanisms [6]. It is based on symmetric key cryptography. Adopted by OSF as the basis of security for DME. OSF (Open Software Foundation) is a foundation created by nine computer vendors, (Apollo, DEC, Hewlett-Packard, IBM, Bull, Nixdorf, Philips, Siemens and Hitachi) to promote "Open Computing" [4].

- The NTLM authentication protocol is the password-based authentication protocol for Microsoft Windows based networking. Microsoft® Windows NT® Server offers superior security services for account management and enterprise-wide network authentication. Windows NT LAN Manager (NTLM) authentication protocol is used by Windows NT 4.0 and previous versions of Windows NT. [6].

- The Secured Socket layer (SSL) **340** (Fig. 3) is the de facto standard today for connections between Internet browsers and Internet Information Servers. An IETF (Internet Engineering Task Force [1]) standard protocol definition based on SSL3 is forthcoming and is currently known as the

Transport Layer Security Protocol (TLS). This protocol makes use of public-key certificates to mutually authenticated clients and servers.

- STk (scheme interpreter for Tk) expresses all of Tk as Scheme objects. Tk is a GUI library, generally used with TCL, but also available from within C or Perl. Tk is available for X Window System, Microsoft Windows and Macintosh. TCL (Tool Command Language), is an interpreted string processing language for issuing commands to interactive programs, developed by John Ousterhout at the University of California at Berkeley, CA, USA [4].

The present invention has been described with certain degree of particularity. Those versed in the art will readily appreciate that various modifications and alterations may be carried out without departing from the scope of the following claims:

CLAIMS:

1. A method for managing a mobile worker, the method comprising the steps of:

   (a) defining a current task assignment schedule to a worker; and

   (b) communicating the current schedule to the worker; and

   (c) monitoring automatically the worker's location during the current schedule; and

   (d) correlating the monitored location with the current schedule; and

   (e) selecting and reporting aspects of the correlation.

2. The method according to claim 1 wherein the current task assignment schedule is modified and the modification to the current schedule is communicated to the worker.

3. The method according to claim 2 wherein modifying the current task assignment schedule is effected automatically.

4. The method according to claim 2 wherein the modification is negotiated with the worker.

5. The method according to claim 1 wherein the defining is using relational database-like rules.

6. The method according to claim 1 wherein the communication is by email, facsimile, cellular telephone voice channel, cellular telephone signal channel (SMS), internet, VOIP telephony, IDEN-type digital radio, or by posting to a worker accessible media.

7. The method according to claim 1 wherein the communicating is in digital form.

8. The method according to claim 1 wherein the communicating includes transmission of voice, data, facsimile, graphics, map,

3   codes, a compressed representation of any of the aforesaid, any

4   combination of the aforesaid, or a content redundant combination

5   of at least two of the aforesaid.

1   **9.**   The method according to claim **1** wherein the monitoring is by

2   cellular telephone cell based locating of the worker and the

3   worker maintains a proximate cellular telephone, by querying the

4   worker and recording the worker's location response, or by GPS

5   locating of the worker and the worker maintains a proximate

6   GPS monitor.

1   **10.** The method according to claim **9** wherein locating includes

2   triangulation or cell intersection.

1   **11.** The method according to claim **1** wherein the monitoring is done

2   periodically, according to anticipated location changes indicated

3   in the current task assignment schedule, randomly, or upon

4   management query.

1   **12.** The method according to claim **1** wherein the monitoring is done

2   at each occurrence of the worker reporting or transacting with

3   management, or upon the turning on a worker's communications

4   unit, or upon each occurrence of a worker's communications unit

5   entering a new communications cell.

1   **13.** The method according to claim **1** wherein the correlating

2   discovers location violations from the current task assignment

3   schedule, measures accuracy of the current task assignment

4   schedule, or measures the worker's productivity against a current

5   standard of productivity for each assigned task.

1   **14.** The method according to claim **1** wherein the selecting is using

2   relational database-like rules.

1   **15.** The method according to claim **1** wherein the reporting is by:

2   email, facsimile, cellular telephone voice channel, cellular

3   telephone signal channel (SMS), internet, VOIP telephony,

4   IDEN-type digital radio, or by posting to a worker accessible

5   media.

1   **16.** The method according to claim 1 wherein the defining of a

2   current task assignment schedule is optimized for minimum

3   travel.

1   **17.** The method according to claim 2 wherein the modified current

2   task assignment schedule is optimized for minimum travel.

1   **18.** The method according to claim 2 wherein the modified current

2   task assignment schedule is using a priority grade for the task

3   assignments and therein is optimized for minimum travel.

1   **19.** The method according to claim 2 wherein the modification to

2   current schedule is communicated to the worker using: email,

3   facsimile, a cellular telephone voice channel, a cellular telephone

4   signal channel (SMS), internet, VOIP telephony, IDEN-type

5   digital radio, or by posting to a worker accessible media.

1   **20.** The method according to claim 1 wherein the correlating is

2   represented on a map.

1   **21.** A method for managing a plurality of mobile workers comprising

2   managing each mobile worker according to the method as

3   defined in any of claims 1-20 wherein the plurality of current

4   task assignment schedules is using a priority grade for the task

5   assignments and a worker qualification grade for each worker.

1   **22.** A distributed system for managing a plurality of mobile workers

2   using the method as defined in any of claims 1-21, the system

3   comprising three types of situated apart, interconnected modules:

4   **(I)**   at least one client application module for:

5   (a) defining a current task assignment schedule to a worker;

6   and

7   (b) communicating the current schedule to the worker; and

8   (d) correlating the monitored location with the current

9   schedule; and

10   (e) selecting and reporting aspects of the correlation, or

11   (f) modifying the current task assignment schedule;

12   **(II)**   at least one server application module for:

13   (b) communicating the current schedule to the worker; and

14   (c) monitoring automatically the worker's location during

15   the current schedule; and

16   (d) correlating the monitored location with the current

17   schedule, or

18   (e) selecting and reporting aspects of the correlation; and

19   **(III)** at least one worker application module, wherein each

20   module is associated with a communication unit and

21   wherein there is a predefined transaction format between

22   any pair of modules.

1   **23.** The system according to claim **22** wherein transactions between

2   the modules include a common Geographical Information

3   System (GIS) location description for the worker and his task

4   assignment.

1   **24.** The system according to claim **23** wherein location descriptions

2   for the worker and his task assignment are represented

3   graphically on at least one map.

1   **25.** The system according to claim **22** wherein fulfilling of a

2   customer request for visitation by a task qualified mobile worker

3   includes: the client application recording the visitation location

4   by using customer query response, using a customer registration,

5   or by using a query response of an accessible database; the client

6   application searching for at least one qualified mobile worker

7   who is presently near the vitiation location or whose task

8   assignment schedule will locate said at least one qualified mobile

9   worker near the visitation location; and the search is conducted

10   using records of the client application or using a last known

11   location for workers accessible from the server application.

1   **26.** The system according to claim **25** wherein the client application

2   selects worker for task assignment scheduling to the visitation

3   location.

1   **27.** The system according to claim **26** wherein the client application

2   conveys worker-customer directs communication information to

3   either the worker or the customer.

1   **28.** The system according to claim **26** wherein the client application

2   negotiates, with the worker or with the customer, adding of the

3   visitation to the workers task assignment schedule.

1   **29.** The system according to claim **22** wherein the client application

2   opens a virtual session at the server application, and provides the

3   server application with automatic rule based monitoring and

4   reporting instruction logic.

1   **30.** The system according to claim **22** wherein the client application

2   module or the server application is divided into two interactive

3   portions, one portion located at a processor of a client and the

4   other portion at a server of a network, and a predetermined

5   transaction protocol binding the two portions.

1   **31.** The system according to claim **30** wherein the portion located at

2   the processor of the client in substantially restricted to simple

3   input and output transactions.

1   **32.** The system according to claim **30** wherein the portion located at

2   the processor of the client maintains a substantially current

3   download of data from the server application.

33. For use in the system of Claim **22**, a client application module.

34. For use in the system of Claim **22**, a server application module.

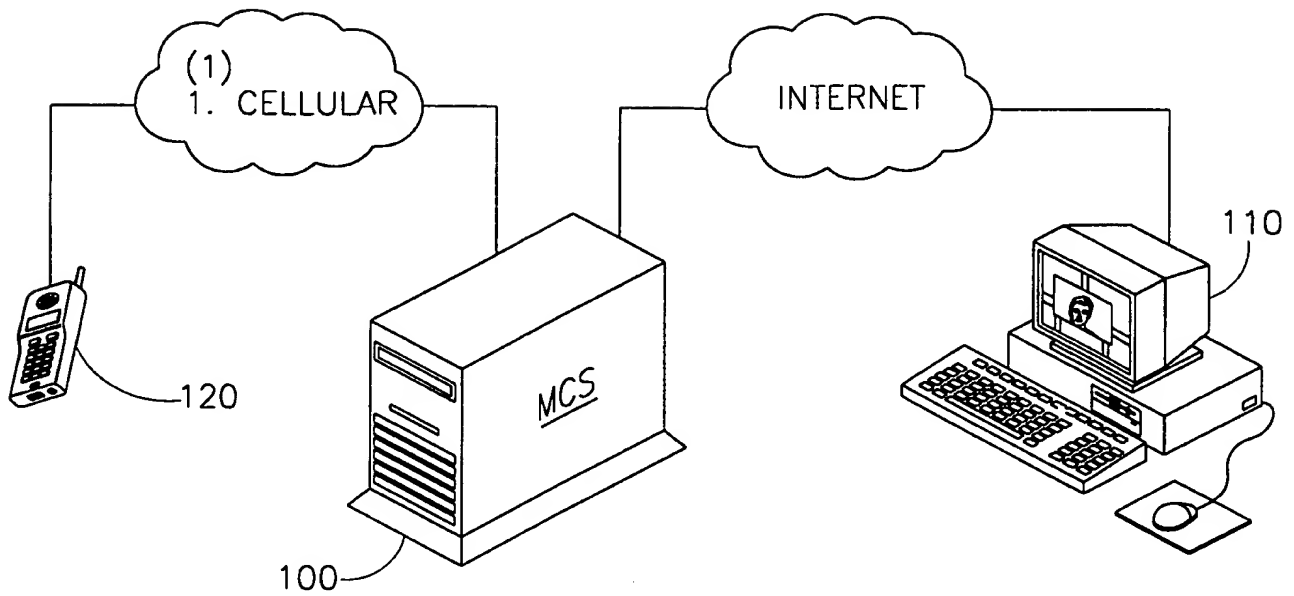35. For use in the system of Claim **22**, a worker application module.

1/2

FIG.1

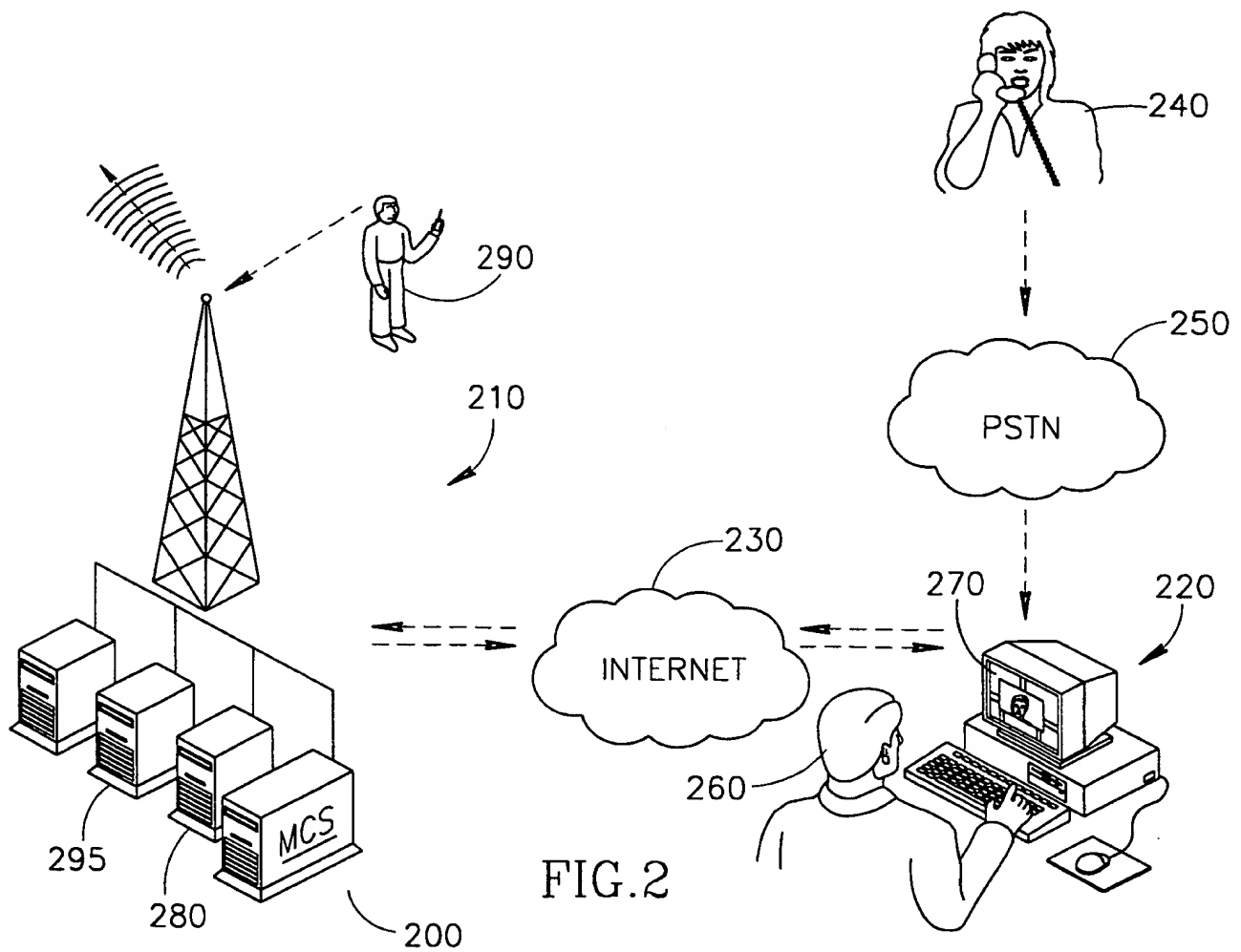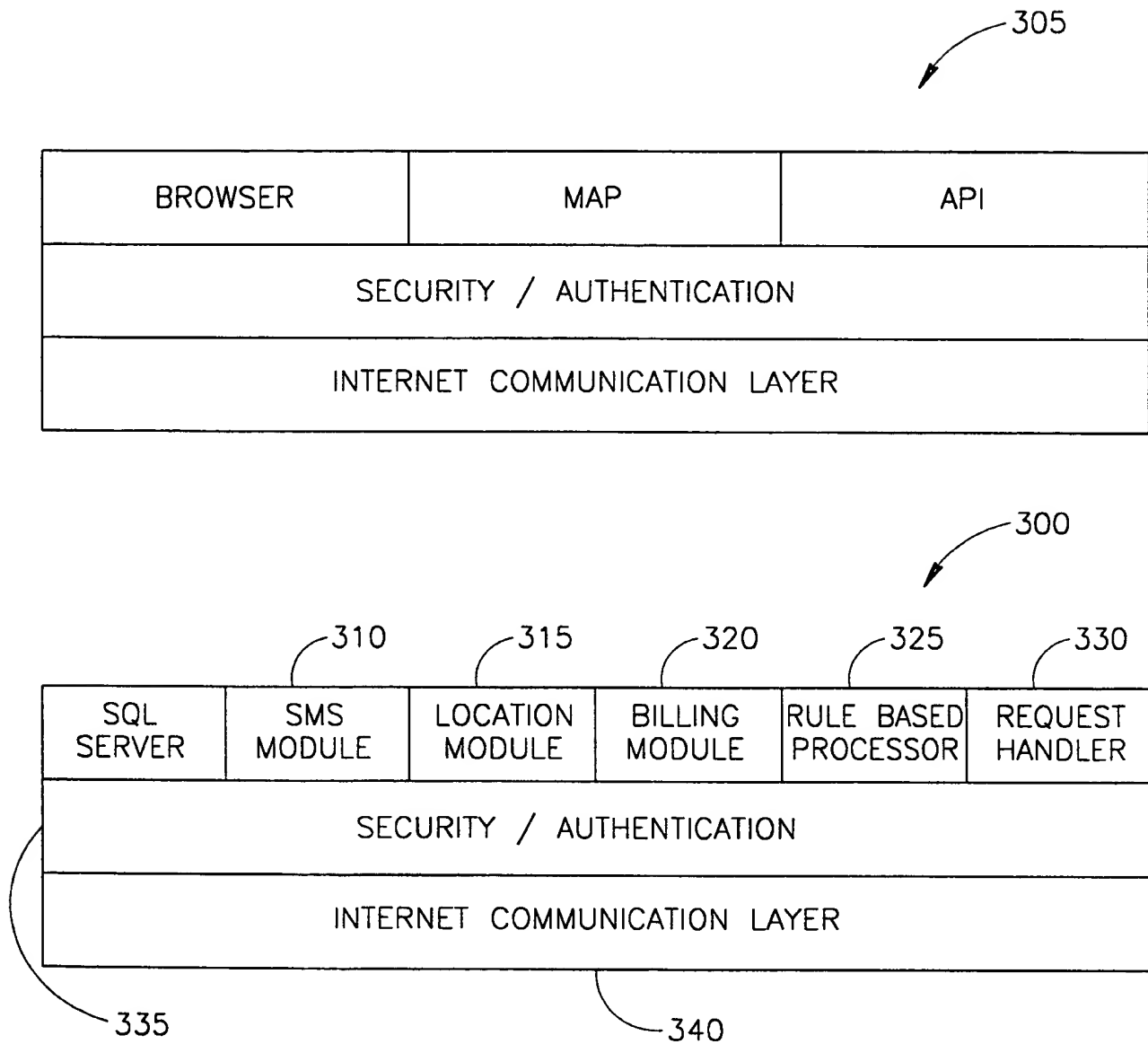FIG.2
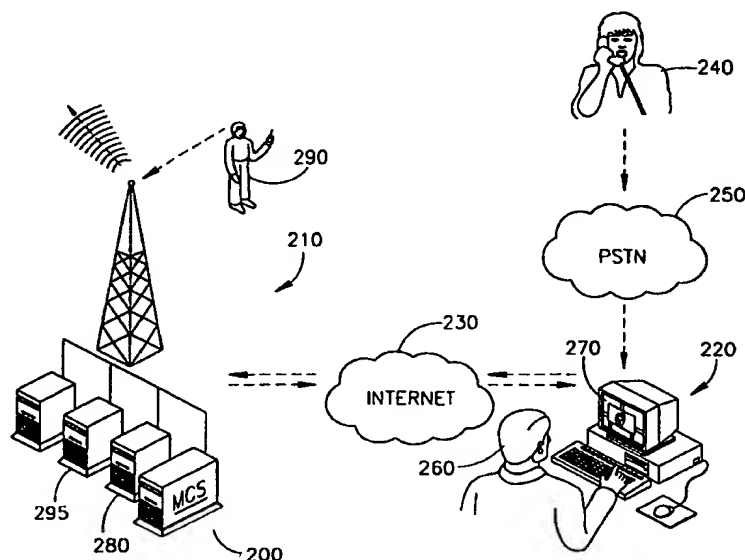
~305

BROWSER	MAP	API
SECURITY / AUTHENTICATION		
INTERNET COMMUNICATION LAYER		

~300

| ~310 | ~315 | ~320 | ~325 | ~330 |

SQL SERVER	SMS MODULE	LOCATION MODULE	BILLING MODULE	RULE BASED PROCESSOR	REQUEST HANDLER
SECURITY / AUTHENTICATION					
INTERNET COMMUNICATION LAYER					

~335   ~340

FIG.3

| (51) International Patent Classification [7] : G06F 17/60 | A3 | (11) International Publication Number: **WO 00/41104** |
| | | (43) International Publication Date: 13 July 2000 (13.07.00) |

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(30) Priority Data:
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(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(88) Date of publication of the international search report:
28 September 2000 (28.09.00)

(54) Title: A METHOD AND SYSTEM FOR MANAGING MOBILE WORKERS

(57) Abstract

A system for managing mobile workers. The system pertains to organizations that employ mobile workers and wish to improve control over the mobile workers, increasing worker's productivity through dynamic workload allocation and job assignment. The system includes a server, installed at the central office switch of the mobile communication (Radio or Cellular) network operator, or service provider and a client system, installed at the service organization's office. The system includes a computerized system operative to: defining a current task assignment schedule to a worker, and communicating the current schedule to the worker, and automatically monitoring the worker's location during the current schedule, and correlating the monitored location with the current schedule, and selecting and reporting aspects of the correlation.

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   G06F17/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7   G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, INSPEC, PAJ, EPO-Internal, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 790 974 A (TOGNAZZINI BRUCE) 4 August 1998 (1998-08-04)	1-4, 6-13, 15-20, 22-24
A	abstract; claims 1-31; figures 1-4 column 1, line 11 -column 3, line 42 column 4, line 1 -column 15, line 18 column 6, line 5 -column 9, line 46 --- -/--	5,14,21, 25-35

[X] Further documents are listed in the continuation of box C.   [X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
30 June 2000	07/07/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Gardiner, A

International Application No

PCT/IL 99/00706

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category°	Citation of document. with indication,where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 2 242 292 A (MIYAGO CO LTD) 25 September 1991 (1991-09-25)	1-4, 6-13, 15-20, 22-24
A	abstract; claims 1-7; figures 1,6-15 page 1, line 2 -page 3, line 27 page 5, line 14 -page 23, line 21 ---	5,14,21, 25-35
A	WO 98 25219 A (HITACHI LTD ;ISE HIROTOSHI (JP); HINO MASATOSHI (JP); OGURA TOSHIH) 11 June 1998 (1998-06-11) abstract ---	1-35
A	US 5 337 044 A (ARNOLD DAVID ET AL) 9 August 1994 (1994-08-09) abstract; claims 1-10 column 1, line 16 - line 61 column 6, line 5 -column 9, line 46 -----	1-35

1

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5790974	A	04-08-1998	NONE		
GB 2242292	A	25-09-1991	JP JP	2821227 B 3268098 A	05-11-1998 28-11-1991
WO 9825219	A	11-06-1998	NONE		
US 5337044	A	09-08-1994	NONE		

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 122123.3 LK	**FOR FURTHER ACTION**	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
International application No. PCT/IL 99/ 00706	International filing date *(day/month/year)* 30/12/1999	(Earliest) Priority Date *(day/month/year)* 31/12/1998

Applicant CT MOTION LTD. et al.

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of _____3_____ sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [ ] furnished subsequently to this Authority in written form.

   [ ] furnished subsequently to this Authority in computer readble form.

   [ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable (See Box I).**

3. [ ] **Unity of Invention Is lacking (see Box II).**

4. With regard to the **title,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been establish d, according to Rul 38.2(b), by this Authority as it appears in Box III. Th applicant may, within one month from th date of mailing of this international search report, submit comm nts to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.   2

   [ ] as suggested by the applicant.   [ ] None of the figures.

   [X] because the applicant failed to suggest a figure.

   [ ] because this figure better charact riz s the invention.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 122123.3 LK	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/IL99/00706	International filing date *(day/month/year)* 30/12/1999	Priority date *(day/month/year)* 31/12/1998

International Patent Classification (IPC) or national classification and IPC G06F17/60

Applicant CT MOTION LTD. et al.

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1.   This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2.   This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒   This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 1 sheets.

3.   This report contains indications relating to the following items:

   I   ☒   Basis of the report

   II   ☐   Priority

   III   ☐   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   IV   ☐   Lack of unity of invention

   V   ☒   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement

   VI   ☒   Certain documents cited

   VII   ☒   Certain defects in the international application

   VIII   ☐   Certain observations on the international application

Date of submission of the demand 16/07/2000	Date of completion of this report 07.08.2001
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Gardiner, A Telephone No. +31 70 340 4261

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, pages:

1-23	as originally filed

Claims, No.:

8 (part),9-35	as originally filed	
1-7,8 (part)	with telefax of	21/02/2001

Drawings, sheets:

1/2,2/2	as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

☐ the description, pages:

☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-35
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-35
Industrial applicability (IA)	Yes:	Claims	1-35
	No:	Claims	

2. Citations and explanations
   see separate sheet

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

   see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

Re Item VI

Certain documents cited

1.   Reference is made to the following documents:

D1: US - A - 5 790 974
D2: GB - A - 2 242 292

2.   Although one interpretation of the majority of the claims may be that they relate to subject-matter considered by this Authority to be covered by the provisions of Rule 67 PCT and that consequently, no opinion should be formulated, the application as a whole refers occasionally to some concrete technical means. It should however be noted that only those features which make some contribution to the technical character of the claimed subject-matter are pertinent to the consideration of inventive step. Non-technically defining steps or features, whilst not precluding the existence of inventive step, are not of consequence in such consideration. The examiner will therefor continue in this case with a consideration of the novelty and inventive step of the claims.

3.   Document D1 , which is considered to represent the most relevant state of the art, discloses a method of managing a mobile worker whereby a person carries a portable calendaring device which synchronises with a central unit by way of wireless communication. The device may signal its position derived from an integrated GPS unit. The system integrates traffic, position and calendar data to determine if a schedule may be maintained and automatically advises the user of an updated schedule if it a change occurs.

3.1   The subject-matter of the claims of the present application differs in that the updated information refers to task assignment for workers. Should the person skilled in the art wish to advise a mobile worker rather than a 'general' user then he would seek work scheduling methods as teaching as to how to do this. In this field he would find D2 which defines exactly such methodology.

3.2 Differrences such as the reliance upon the skill level of the worker being included in the decision process or the increase in productivity targeted through the application of the claimed subject-matter is clearly lacking in any techncial import and as such has

been disregarded.

3.3 As the dependent claims go on to define e.g. well known manners of determining position and of communication or to attempt to define the subject-matter for which protection is desired by way of definition of purely organizational steps relating to commercial advantage rather than technical definition, no inventive (Article 33 PCT) contribution is perceived in the claims, or indeed in the application as a whole.

4.   Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.

4.1   The features of the claims should be provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

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1 **CLAIMS:**

2 1.   A method for facilitating the ability of a service organization engaging

3   ~~mobile workers to find a worker qualified to carry out tasks to be carried~~

4   out in behalf of a customer of the organization and for then managing the

5   selected mobile worker to increase his productivity, the method comprising

6   the steps of:

7   (a)   searching for a qualified worker located in the vicinity of the

8   customer;

9   (b)   defining a current task assignment schedule to a worker;

10   (c)   communicating the current schedule to the worker;

11   (d)   automatically monitoring the worker's location during the current

12   schedule; and

13   (e)   correlating the monitored location with the current schedule; and

14   (f)   selecting and reporting aspects of the correlation.

1 2.   The method according to claim 1 wherein the current task assignment

2   schedule is modified and the modification to the current schedule is

3   communicated to the worker.

1 3.   The method according to claim 2 wherein modifying the current task

2   assignment schedule is effected automatically.

1 4.   The method according to claim 2 wherein the modification is negotiated

2   with the worker.

1 5.   The method according to claim 1 wherein the defining is using relational

2   database-like rules.

1 6.   The method according to claim 1 wherein the communication is by email,

2   facsimile, cellular telephone voice channel, cellular telephone signal

3   channel (SMS), internet, VOIP telephony, IDEN-type digital radio, or by

4   posting to a worker accessible media.

1 7.   The method according to claim 1 wherein the communicating is in digital

2   form.

3 8.   The method according to claim 1 wherein the communicating

4   includes transmission of voice, data, facsimile, graphics, map,

AMENDED SHEET
IPEA/EP

07 08 2001